

PATENT SPECIFICATION

(11) 1 291 989

DRAWINGS ATTACHED

- (21) Application No. 58997/69 (22) Filed 3 Dec. 1969
 (31) Convention Application No. 8394 (32) Filed 10 Dec. 1968 in
 (33) Czechoslovakia (CS)
 (45) Complete Specification published 4 Oct. 1972
 (51) International Classification H02K 3/22
 (52) Index at acceptance
 H2A 2E4Y 2E9 7B 8AY
 F2G 18A 1B
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(54) IMPROVEMENTS IN OR RELATING TO ROTATING ELECTRIC MACHINES LIQUID COOLED STATOR WINDINGS

(71) We, SKODA, NARODNI PODNIK, a Czechoslovakian Body Corporate, of Plzen, Czechoslovakia, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to rotating electrical machine stator windings, composed of insulated bars formed from single conductors some of which are hollow and provided with direct internal liquid cooling.

According to the invention, the ends of a pair of bars of such a winding are electrically and hydraulically inter-connected by a fitting manufactured from a seamless thickwalled tube of circular cross-section of good electrically conductive material, which fitting comprises two sleeves and a U-shaped elbow having substantially parallel cylindrical ends, which cylindrical ends are for a part of their length slid into said sleeves with a clearance required for brazing and are brazed liquid-tightly within said sleeves, the free ends of said sleeves being shaped in accordance with the bar ends received therein and dimensioned to accommodate said bar ends with a clearance required for brazing.

Preferably the material of which the sleeves and the elbow are manufactured is electrolytic copper.

Some of the U-shaped elbows may be fitted, on the outer bend thereof, with a screw joint for the admission or discharge of the cooling liquid.

Assembly of the fitting on a winding embodying the invention is much facilitated by the parallel arrangement of the elbow ends since discrepancies in the spacing of the bar ends of the winding of which the fitting former part can be compensated by displacing the elbow either angularly or parallel to itself.

The smooth simple shape of the fitting is very suitable for being fitted with insulation.

By removing the U-shaped elbow, it is easy to exchange single bars or to repair damaged insulation.

A specific embodiment of the invention will now be described by way of example with reference to the accompanying drawing in which:

Figure 1 shows a broken elevational view of part of a stator winding embodying the invention; and

Figure 2 shows an end view of the winding of Figure 1.

As shown in Figure 1, the stator winding is composed of bars 3 formed from single conductors some of which are hollow. A fitting for electrically and hydraulically inter-connecting a pair of these bars comprises two sleeves 1 and a U-shaped elbow 2. The sleeves 1 and elbow 2 are formed from thickwalled seamless tubes of good electrically conductive material, for example electrolytic copper.

Each sleeve 1 is for a part 5 of its length seated upon a cylindrical end 6 of the elbow 2, with a clearance 7 which permits the brazing operation by which the sleeve 1 is joined in liquid-tight fashion to the elbow 2. The free end of each sleeve 1 is shaped to provide a cavity 8 which, after the sleeves are slid onto the non-insulated ends of the bars 3, will accommodate the non-insulated ends of the bars 3 with clearances 9 which are sufficient to permit the formation of a liquid-tight brazed joint between each sleeve 1 and bar 3.

In this embodiment, the elbow 2 has, on its outer bend, a screw joint 4 for the admission or discharge of the cooling liquid.

The straight parallel ends 6 of the elbow 2 facilitate the inter-connection of the bars 3 by the fitting when the fitting is assembled on the bars, since said ends 6 are simply slid into the parts 5 of the sleeves 1. This will be possible, within limits, even if the sleeves 1, because of inaccuracies of manufacture, are displaced longitudinally or transversely. Figure 1 shows by means of broken lines 10

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how longitudinal displacement of one elbow end 6 within its associated (upper) sleeve 1 during manufacture of the fitting compensated for corresponding displacement of the other 5 (lower) sleeve 1 along its associated bar 3 when the fitting and winding bars are assembled together. Figure 2 shows, by means of broken lines 11, how transverse displacement of one sleeve 1 when the fitting is 10 assembled on the winding bars can be made to compensate for transverse misalignment of the bars 3 which the fitting is intended to connect.

WHAT WE CLAIM IS:—

1. A rotating electrical machine stator 15 winding composed of insulated bar formed from single conductors some of which are hollow and provided with direct internal liquid cooling, the ends of a pair of said bars being electrically and hydraulically interconnected 20 by a fitting manufactured from a seamless thickwalled tube of circular cross-section of good electrically conductive material, the fitting comprising two sleeves and a U-shaped elbow

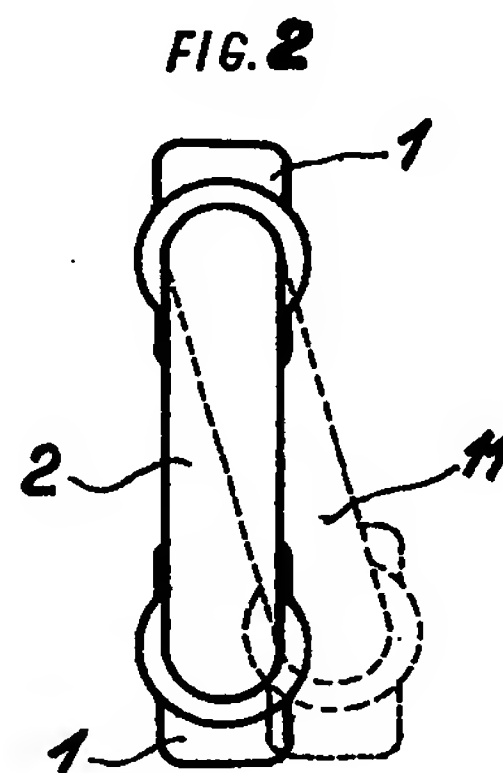
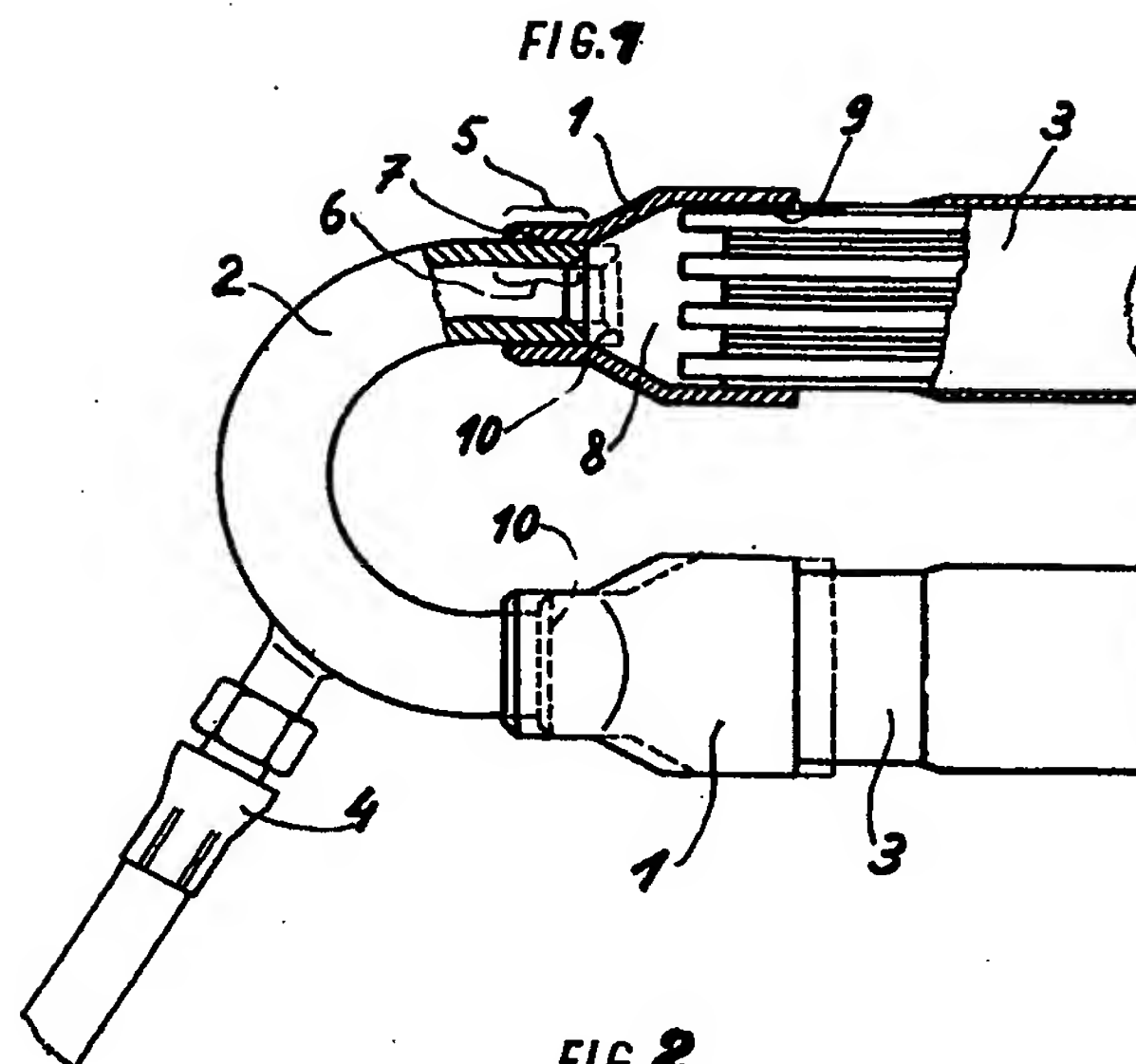
having substantially parallel cylindrical ends, 25 which cylindrical ends are for a part of their length slid into said sleeves with a clearance required for brazing and are brazed liquid-tightly within said sleeves, the free ends of said sleeves being shaped in accordance with 30 the bar ends received therein and dimensioned to accommodate said bar ends with a clearance required for brazing.

2. A winding as claimed in claim 1 wherein the elbow and the sleeves are manufactured 35 from electrolytic copper.

3. A winding as claimed in claim 1 or claim 2, wherein the U-shaped elbow is provided, on its outer bend, with a screw joint for the admission or discharge of cooling liquid. 40

4. A winding substantially as hereinbefore described with reference to and as illustrated in the accompanying drawing.

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